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22931
S/123/61/000/003/005/013
A004/A104

AUTHOR: Layner, V.I.

TITLE: Chrome plating of aluminum and magnesium alloys

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 8, 1961, 97, abstract 8B735 (V sb. "Vopr. teorii khromir." Vil'nyus, Gospolitizdat LitSSR, 1959, 151 - 163, Diskus., 177 - 191)

TEXT: The Moskovskiy institut tsvetnykh metallov i zolota (Moscow Institute of Nonferrous Metals and Gold), based on laboratory and production tests, has established the optimum conditions for the protective-ornamental and hard chrome plating of aluminum and magnesium alloys. The maximum adhesion and optimum corrosion resistance of chrome platings on aluminum and its alloys are obtained in the following way: careful surface preparation (grinding, polishing, cathode degreasing in weak alkali solutions, pickling and clarification); application of a thin and compact zinc film by dipping in a concentrated zinc solution with the addition of modifiers - ferrous chloride, Seignette's salt, sodium nitrite; nickel plating prior to chrome plating in an ordinary electrolyte at 40-45°C, pH 5.6, current density 1.5-2.0 amp/dm² with subsequent 30-minutes heating at 320-330°C in

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Chrome plating of aluminum and magnesium alloys

a vacuum or deoxidizing atmosphere (Ni-thickness for light-duty conditions should be $10\ \mu$, for heavy-duty conditions the aggregate thickness of the Ni+Cu+Ni coat should be some $50\ \mu$ with a thin chromium layer). For magnesium and its alloys the following technology is recommended: electrolytic degreasing in ordinary alkali solutions; 1-2 minutes pickling in a solution consisting of CrO_3 - 180, NaNO_3 - 30, CaF_2 - 2.5 gram/liter (foundry alloys in 85% H_3PO_4); 2 minutes activation at room temperature in a solution of 85% H_3PO_4 - 250 milliliter/liter + KHF_2 - 100 gram/liter; application of a 2.5-3 μ zinc film by dipping for 7-9 min. at 85-90°C in a solution consisting of: $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ - 45, $\text{Na}_4\text{P}_2\text{O}_7$ - 210, $\text{KF} \cdot 2\text{H}_2\text{O}$ - 7, Na_2CO_3 - 5 gram/liter; copper plating in a cyanogen electrolyte at 65-70°C, pH 12.2-12.8, at a current density of 4 amp/dm² during the first 30 sec., then 1-2 amp/dm² (a layer of 1 - 3 μ ensures a stable adhesion of a 100-150 μ chromium layer); chrome plating for the protection from mechanical wear at 55°C and a current density of 50 amp/dm², for the protection from corrosion at 70°C and 30 amp/dm². Corrosion tests showed that a satisfactory protection of magnesium alloys only warranted at an aggregate thickness of the Cu+Ni+Cr layer of 50 μ , the Ni-layer being 20 μ .

L. Kamionskiy

[Abstracter's note: Complete translation]

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AUTHORS: Layner, V.I., Doctor of Technical Sciences, Professor SOV/122-59-2-23/34
Konstantinova, G.S., Engineer

TITLE: Copperising and Nickel Plating Magnesium Alloys
(Medneniye i nikelirovaniye magniyevykh splavov)

PERIODICAL: Vestnik Mashinostroyeniya, 1959, Nr 2, pp 62-65 (USSR)

ABSTRACT: The authors recommend the following procedure for galvanic coating of magnesium alloys:

- 1) Degrease with organic solvent.
- 2) Degrease electrolytically in a solution of 23 gramme/litre Na_2CO_3 , 16 g/l NaOH at room temperature with current density 10 amps/decimetre².
- 3) Rinse in warm and in cold water.
- 4) Pickle in a solution: 180 g/l CrO_3 , 30 g/l NaNO_3 , 2.5 g/l CaF_2 at room temperature for 1 to 2 minutes. Cast alloys are pickled in 85% H_3PO_4 .
- 5) Rinse in sold water.
- 6) Activate in a solution: 250 mm/litre H_3PO_4 (85%), 100 g/l KHF_2 at room temperature for 2 minutes.
- 7) Rinse in cold water.

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Copperising and Nickel Plating Magnesium Alloys

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- 8) Dip deposition of zinc from a solution:
45 g/l $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, 210 g/l $\text{Na}_4\text{P}_2\text{O}_7$, 7 g/l $\text{KF} \cdot 2\text{H}_2\text{O}$,
5 g/l Na_2CO_3 at temperature 85 to 90°C for 7 to 9 min.
- 9) Rinse in cold water.
- 10) Copperise in cyanic electrolyte consisting of:
41 g/l CuCN , 51 g/l NaCN (combined), 5.6 g/l NaCN (free),
30 g/l Na_2CO_3 and 45 g/l $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot \text{H}_2\text{O}$ at temperature
of 65° to 70°C, pH = 12.2 to 12.8. The current density
is held at 4 amps/dm² for 30 seconds and further
deposition to a given thickness should proceed at
1 to 2 amps/dm². For deposition of thick layers
copperising can be combined in cyanic and acid
electrolytes.

Nickel and chrome plating both for protective and decorative purposes should proceed in usual electrolyte and at usual conditions after deposition of the copper as above. Graphs are given of loss in weight of magnesium alloy versus time of pickle (Fig 1); dependence of the thickness of zinc coating on temperature for a

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Copperising and Nickel Plating Magnesium Alloys

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7 minute dip (Fig 2); on time of dip held at 70°C (Fig 3) and on time of activation (Fig 4). Rate of outgassing of hydrogen in a 1% salt solution for different thicknesses of copper and nickel coatings is shown in Fig 6, using apparatus as in Fig 5. There are 6 figures, 2 tables and 5 English references.

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SOV/122-59-5-22/32

AUTHORS: Layner, V.I., Doctor of Technical Sciences, Professor,
and Pañchenko, I.I., Engineer

TITLE: Nickel Plating in Fluoroborate Electrolyte
(Nikelirovaniye vo ftorboratnom elektrolite)

PERIODICAL: Vestnik mashinostroyeniya, 1959, Nr 5, pp 65-68 (USSR)

ABSTRACT: An experimental study is reported concerned with the effect of each of the main factors on the nickel plating process in fluoroborate electrolytes. The solution of hydrofluoboric acid was prepared from hydrofluoric and boric acids by mixing the latter into the former in small doses accompanied by stirring and external cooling. Small doses of nickel carbonate were added accompanied by cooling. Concentrates with a specific gravity of 1.5 containing 180 g/litre of nickel can be obtained as fluoroborate of nickel. The fluoroborate of nickel has the formula $\text{Ni}(\text{BF}_4)_2 \cdot 6\text{H}_2\text{O}$. A method of analysis was used proposed by Ryss, I.G. ("The Chemistry of Fluorine and its Anorganic Compounds" Monograph, Goskhimizdat, 1956). Nickel was determined by the alkaline solution of di-methylglyoxime. 500 milli-litres of diluted

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Nickel Plating in Fluoroborate Electrolyte

concentrate were used in each test with a nickel anode and a cathode of copper, iron or brass foil. The current efficiency was measured with a copper coulometer. The specimens were electro-chemically degreased, pickled in nitric acid (copper, brass) or hydrochloric acid (iron), washed in water then in alcohol, dried, cooled and weighed. Before immersing in the plating bath, the specimens were pickled in a 10% solution of sulphuric acid, washed in mains water and finally in distilled water. After plating, the specimens were washed in cold and hot water and in alcohol, dried, cooled and weighed. The curves of voltage against current density were plotted from measurements by the compensation method using a platinum disc cathode soldered into molybdenum glass. Before taking the readings, the cathode was covered by a 5 micron coat of copper from a sulphuric acid electrolyte. The deposited nickel was removed in hot 50% HNO_3 or by anodic dissolution in 50% H_2SO_4 .

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Nickel Plating in Fluoroborate Electrolyte

The anode was a disc of non-passivated nickel. Examining the effect of nickel salt concentration an increase from 1 N to 3 N solutions at a pH of 3.0 and 50°C increases the permissible current density. Deposits of 25 microns are obtained without burns and dendrite formation at the corners. Further increase of concentration is not profitable. The concentration of boric acid has no effect on the current efficiency and the quality of the deposit. Solutions with a small excess of boric acid (10 g/litre) are more stable. The effect of chlorine ion concentration was studied by using electrolytes without chlorine ions and those with 15, 30 and 50 g/litre $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$. Without chlorine ions, the quality of the deposit deteriorates, pitting increases, the current efficiency diminishes and the permissible current density drops. 15 g/litre is the best concentration. A temperature increase is beneficial by reducing polarization. The permissible current density increases and the quality of the deposit improves up to a temperature of 60°C. The pH value was

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Nickel Plating in Fluoroborate Electrolyte

studied in the range between 1 and 5. At a value of 4 and above the solution becomes unstable. At values of 1 and 2 the deposit contains much small pitting. The optimum value is 3. The buffer properties were studied at a temperature of 20°C by adding to fresh samples of 50 millilitre of electrolyte quantities of 10, 20 and 30 millilitre of 0.2N solution of NaOH and 0.2N solution of HCl and the measurement of the pH value of the solution by the quinhydrone method. The electrolytes differed in the nickel, boric acid and chloride content. Sulphuric acid electrolytes were examined alongside the fluoroborate electrolytes. It was shown that fluoroborate electrolytes have a substantially greater buffer property than sulphuric acid electrolytes with buffer admixtures. The stability of the electrolyte of the optimum composition, after plating under optimum conditions, was judged by analysis for nickel, fluorine, boron and the pH value after 100 ampere-hours. A very good stability was observed. The anode to cathode surface ratio was varied between 8:1 and 1:1.

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Nickel Plating in Fluoroborate Electrolyte

After 300 ampere-hours per litre of electrolyte, the nickel, both forms of fluorine and boron contents did not change. The pH value rose from 3 to 3.4. The anode and cathode polarizations were plotted (Fig 6). The adhesion of deposits on iron, brass and copper specimens was judged by bending over 180° until fracture and by heating to 150°C. Deposits of 10, 30, 60, 100 and 500 microns were tested. Except in the thickest deposit, no delamination was found. In deposits beyond 30 microns, porosity was not observed. There are 6 figures, 1 table and 11 references, 8 of which are English, 2 Soviet and 1 French.

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LAYNER, V.I., prof., doktor tekhn. nauk; KONSTANTINOVA, G.S., inzh.

Copper and nickel plating of magnesium alloys. Vest. mash. 39
no.2:62-65 F '59. (MIRA 12:3)
(Copper plating) (Nickel plating) (Magnesium alloys)

SHREYDER, Aleksandr Viktorovich, dotsent, kand.tekhn.nauk; LAYNER, V.I.,
prof., doktor tekhn.nauk, retsenzent; ZARETSKIY, Ye.M., kand.
tekhn.nauk, retsenzent; ARKHANGEL'SKAYA, M.S., red.izd-va;
ISLENT'YEVA, P.G., tekhn.red.

[Oxidation of aluminum and its alloys] Oksidirovanie aliuminia
i ego splavov. Moskva, Gos.nauchno-tekhn.izd-vo lit-ry po chernoi
i tsvetnoi metallurgii, 1960. 220 p. (MIRA 13:9)
(Aluminum) (Metallic films)

S/122/60/000/002/016/018
A161/A130

AUTHORS: Layner, V. I., Doctor of Technical Sciences, Professor; Velichko, Yu. A., Engineer

TITLE: Electrodepositing thick layers of nickel-cobalt alloys

PERIODICAL: Vestnik mashinostroyeniya, no. 2, 1960, 73 - 76

TEXT: A new method is used by some Anglo-Scandinavian companies for producing die-casting and press molds for plastics - by electrodepositing 3 - 4 mm deep nickel-cobalt alloy layers of above HRU 40 hardness. The advantages of the method are obvious, and the conventional mechanical making sometimes takes a highly skilled engraver a whole year to carve a complex die. The method being the result of 14 years studies, is a patent. Experimental data concern the effect of different relative concentrations of Ni and Co salts in the electrolyte on the deposit composition at different current densities; the effect of pH and stirring (by air blown through a perforated pipe); the effect of different combinations of anode and cathode metals. The best results were obtained with separate anodes of Ni and Co and separate current supply to them, in a combination with a 12 v 3CA-5 (VSA-5) selenium rectifier for the current source and a 6 v acid storage

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Electrodepositing thick layers of nickel-cobalt alloys

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battery connected to its terminals, and rheostats for controlling the currents. The electrolyzer was a glass vessel of 7 liter capacity. In view of little difference between the Ni and Co electrochemical equivalents different metal compositions were produced by current supply variations, e.g., 30% of the total current was supplied to the Co anode having 30% Co in the alloy. Several experiments were carried out, between 2 and 12 days duration. Concentrated CoSO_4 was added by drops into the bath to maintain a constant electrolyte composition, but it was practically impossible by such means. Layers of 3 - 4 mm were obtained with dendritic structure, and banded. Analogous bandedness had been frequently stated previously when organic gloss agents were added into nickel electrolyte (Refs. 3 and 4). The bands were wide and narrow. The wide bands are supposed to be due to electrolyte composition variations with time (mainly the Co and Ni salts content), and the many narrow bands by cycles in cathode process, i.e., periodical oxide formations. The temperature, current density, stirring, Ni and Co concentrations and the effect of buffer compounds affecting the pH in the cathode layer, seems to be the reason why the bands were not found throughout the entire photo-micrographs but in spots (for the current density was not equal throughout). The deposit hardness depended clearly on the Co content and rose up to 40% Co., to RC 40, then remained practical-

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Electrodepositing thick layers of nickel-cobalt alloys

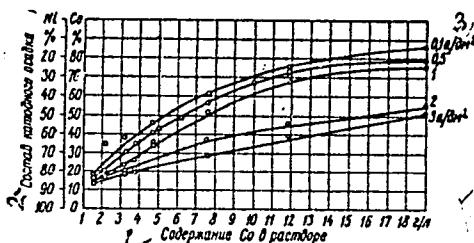
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ly constant. Higher hardness was reached with electrolytes containing ammonium sulfate, but only in single cases. There are 8 figures and 4 references: 2 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: A. John, Henricks, Trans. Electrochem. Soc., v. 82, 1943; C. B. F. Young and Clifford Struyk, Trans. Electrochem. Soc., v. 89, 1946.

Fig. 1. The effect of Co content in electrolyte and current density on the deposit composition.

Legend: 1 - Co content in g/liter;
2 - The composition of deposited alloy; 3 - Current density, amp/dm².



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LAYNER, V.I.; VELICHKO, Yu.A.

Electroforming of nickel-cobalt alloy inserts for casting and
pressing plastic products. Sbor. nauch. trud. GINTSVETMET
no.33:405-420 '60. (MIRA 15:3)
(Electroforming) (Nickel-cobalt alloys)

SHLUGER, Mikhail Aleksandrovich, kand. tekhn. nauk; LAYNER, V.I., doktor tekhn. nauk, prof., retsenzent; KUNIN, P.A., inzh., red.; SMIRNOVA, G.V., tekhn. red.; GORDEYEVA, L.P., tekhn. red.

[Accelerating and improving the chromium plating of machine parts]
Uskorenie i usovershenstvovanie khromirovaniia detalei mashin. Moskva, Mashgiz, 1961. 139 p. (MIRA 14:12)
(Chromium plating)

S/123/62/000/006/009/018
A004/A101

AUTHOR: Layner, V. I.

TITLE: Brass plating

PERIODICAL: Referativnyy zhurnal, Mashinostroyeniye, no. 6, 1962, 43, abstract
6B212 (V sb. "Elektrolit. osazhdeniye splavov", Moscow, Mashgiz,
1961, 129-141)

TEXT: The author analyzes the main contemporary information on the brass plating process. He presents data on equilibrium and cathode potentials of copper and zinc in solutions of simple and complex salts and on the effect of the concentration of free cyanide on the composition of the brass deposit. The author mentions the method of electrolyte preparation, anodes employed, recommended electrolytes and their conditions. The following composition is most widely used (in g/l): copper (in the form of CuCN) - 20, zinc (in the form of ZnO) - 7.5, NaCN (free) - 10, Na_2SO_3 - 10, NH_4OH (25%) - 0.25, at a current density of 0.3 - 0.5 amp/dm², a temperature of 30 - 40 °C and a pH-value of 11. To accelerate the brass plating process (by way of increasing the current efficiency and the current density) it is necessary to maintain in the electrolyte a high concentration of sodium
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Brass plating

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tion of sodium cyanide and copper cyanide. Moreover, it is necessary to add zinc in the form of its oxide and a considerable amount of caustic soda to increase the electric conductivity and reduce the activity of the zinc ions. The author presents the composition of such an electrolyte (in g/l) and its operating conditions: NaCN (total) - 90-135. CuCN - 75 - 105, NaOH - 45 - 75, ZnO - 3 - 9, excess NaCN - 4 - 19. The Cu-to-Zn ratio in the electrolyte is from 10:1 to 20:1, the temperature 75 - 95°C, the cathode current density is 2.5 - 5.5 amp/dm². The cathode deposit varies from 75 to 83% Cu (the rest being zinc) and has a satisfactory outer appearance. In this electrolyte, the current efficiency somewhat decreases with an increase of current density and free cyanide content, however, the absolute values of the current efficiency and admissible current densities by far exceed those of the electrolytes used usually. The author describes an electrolyte control to systematically determine the copper, zinc and free cyanide content and pH. He gives an account of brass plating in non-cyanogen electrolytes. It is emphasized that, hitherto, there are no full-value substitutes for cyanogen electrolytes. Therefore, non-cyanogen electrolytes should only be used in extreme cases, i.e. for coating unimportant parts. ✓

[Abstracter's note: Complete translation]

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S/123/62/000/006/005/018
A004/A101

AUTHOR: Layner, V. I.

TITLE: Electrodeposition of copper-tin alloys

PERIODICAL: Referativnyy zhurnal. Mashinostroyeniye, no. 6, 1962, 41, abstract
6B203 (V sb. "Elektrolit. osazhdeniye splavov", Moscow, Mashgiz,
1961, 161-172)

TEXT: The author presents the results of investigating the conditions of electrodeposition of copper-tin alloys, these investigations being carried out by different research workers. It is shown that the composition of copper-tin alloys is mainly regulated by the copper and tin salt ratio in the electrolyte (from cyanostannate electrolytes, copper is better deposited on the cathode than tin). If the free cyanide content is increased, the copper content in the cathode deposition decreases and the tin content increases. Free alkali affects the deposition composition in an opposite way. Copper-tin coatings are deposited at a temperature of $65 \pm 2^{\circ}\text{C}$, an optimum current density of $2 - 5 \text{ amp/dm}^2$. For the application of bronze coatings with a low tin content, bronze anodes are used, while for white bronze coatings split anodes are employed, the current

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Electrodeposition of copper-tin alloys

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density being regulated. A bronze sublayer with 10 - 12% Sn under a nickel and chromium coating ensures better protection than a copper sublayer of the same thickness. Bronze coatings with 20 - 22% Sn show a high resistance to tarnishing and with subsequent chrome plating they preserve well the outer aspect of the article. The use of a bronze sublayer permits the reduction of the thickness of the nickel coating and, in some cases, even its substitution.

[Abstracter's note: Complete translation]

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S/123/62/000/006/010/018
AC04/A101

AUTHOR: Layner, V. I.

TITLE: Tin-zinc and tin-cadmium alloy coatings

PERIODICAL: Referativnyy zhurnal. Mashinostroyeniye, no. 6, 1962, 43, abstract 6B213 (V sb. "Elektrolit. osazhdeniye splavov". Moscow, Mashgiz, 1961, 173-185)

TEXT: The author investigated the electrodeposition conditions of tin-zinc and tin-cadmium alloys. To obtain an alloy of 75% Sn and 25% Zn composition, the author recommends an electrolyte in which the sodium cyanide has been replaced by trilon B (B) (in g/l): $\text{Na}_2\text{SnO}_3 \cdot 3\text{H}_2\text{O}$ - 70, ZnCO_3 - 1.5, NaOH - 10, trilon B - 50 ml/l. at a temperature of 70°C , a cathode current density of 2 amp/dm² and an anode density of 1.5 - 2 amp/dm². To obtain an alloy with 80% Sn and 20% Zn, the following pyrophosphate electrolyte is recommended: $\text{K}_6[\text{Sn}(\text{P}_2\text{O}_7)_2]$ - 0.05 n; $\text{K}_6[\text{Sn}(\text{P}_2\text{O}_7)_2]$ - 0.55 n; $\text{K}_4\text{P}_2\text{O}_7$ (free) - 1.2 n; glue - 1 g/l, at a temperature of 60°C and a current density of 2 amp/dm². Anodes of 80% Sn and 20% Zn composition are used. The author analyzes the effect of the electrolyte and electrolysis conditions on the current efficiency in deposition of tin-zinc alloys and

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Tin-zinc and tin-cadmium alloy coatings

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also the electrolyte compositions and conditions for the production of tin-cadmium coatings with 25 and 50% Sn. The corrosion tests carried out showed that coatings with 67% Sn and 33% Zn or 76% Sn and 24% Zn alloys are characterized by high protective properties and can be recommended for the corrosion protection of parts under tropical conditions (which is also the case for Sn-Cd coatings).

[Abstracter's note: Complete translation]

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S/137/62/000/004/149/201
AO60/A101

17.12.10 (2408)

AUTHOR: Layner, V. I.

TITLE: Galvanic coating of bushings from antifriction aluminum alloys with a lead-tin layer

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 4, 1962, 107, abstract 4I653
(V sb. "Elektrolit. osazhdeniye splavov". Moscow, Mashgiz, 1961, 186 - 197)

TEXT: Bimetallic (steel-aluminum antifriction alloys) journal bushings may be electrolytically coated with an alloy of 8 - 10% Sn-Pb. The composition of the hydrofluoboric electrolyte (in g/liter) is: Sn 10, Pb 90, HBF₃ free 40, H₃BO₃ 25, gum 0.5; D_C 2 amps/dm², temperature 20°C. The Sn content in the cathodic deposit increases as the Sn content in the electrolyte and the D are increased. A reliable cohesion between the Al- and Pb-Sn alloys is ensured as result of a careful preparation of the surface. The preparation includes the dipping in a sodium zincate solution and the electrodeposition of an intermediate Ni layer with a 30 minute heating at 200 - 220 C. The deposition of a Cu coating from a cyano-

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Galvanic coating of bushings from...

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genic electrolyte as the under-layer does not always ensure a reliable cohesion between the base and the coating. A one-sided coating of bushings by either Ni or a Pb-Sn alloy is possible only in special accessories. There are 5 references.

Author's summary

[Abstracter's note: Complete translation]

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S/122/61/000/001/007/015
A161/A130

AUTHORS: Layner, V. I., Professor, Doctor of Technical Sciences;
Velichko, Yu. A., Engineer

TITLE: Nickel-cobalt alloy mold inserts for plastics produced by
electroplating

PERIODICAL: Vestnik mashinostroyeniya, no. 1, 1961, 47 - 51

TEXT: The authors carried out an experimental investigation in attempt to find out the technology used by a not named British-Skandinavian company advertizing a new method for producing electroplated nickel-cobalt alloy die inserts for casting and pressing plastics. The first information on these experiments had been published previously (Ref. 3: V. I. Layner, Yu. A. Velichko, Elektroosazhdeniye nikel'kobal'tovykh splavov v tolstykh sloyakh. "Vestnik mashinostroyeniya, no. 2, 1960). The method is a patent of the foreign company and the result of a 14-year development which is continued with the purpose to obtain hardness of above HRC 40 and extend applications. The authors obtained results proving that it is possible to produce low-stressed Ni-Co deposits of

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Nickel-cobalt alloy mold inserts

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3 - 4 mm depth and about HRC 40 hardness. The method requires the making of only one positive pattern, e.g., of organic glass, or a ready workpiece from plastic or metal may be used for pattern. A nonmetallic pattern has to be silverplated to produce a conductive layer, and a metal pattern by a separating layer. Then the pattern is electrochemically coated with thin films of nickel and copper out of electrolytes with sulfuric acid, and charged into electrolyte for 12 - 20 days for depositing a thick Ni-Co layer. The outside of the pattern is plated with a thick layer of copper and machined on a lathe to required dimensions. The article gives a detailed information on the techniques and materials used in the experiments. The deposits were dull. Electropolishing in sulfuric acid was tried to make them bright. The following conclusions are made: It has been proven that molding inserts of Ni-Co alloy can be produced on patterns of polystyrene, organic glass and other materials; the best method for coating a conductive layer is chemical silverplating and using invert sugar, Rochelle salt, glucose, or other matter for reduction; it is possible to precipitate nickel and cobalt on the cathode from solutions of simple salts, and to obtain alloy layers of considerable depth. Senior laboratory assistant N. S. Galimova took part in the experiments. There are 6 figures and 4 Soviet-bloc references.

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D244/D301

5.1310

1987, 1160, 1164

AUTHORS: Belen'kiy, M.A., Engineer; Layner, V.I., Doctor of Technical Sciences, Professor; Petrova, O.A., Candidate of Technical Sciences

TITLE: Bright nickel plating with levelling additives

PERIODICAL: Vestnik mashinostroyeniya, no. 7, 1961, 37-41

TEXT: This article gives the results of research on the above problem conducted by the TsNII Mashdetal'. An electrolyte of the following composition was chosen: 250 to 3000 gm/l of nickel sulphate ($\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$), 40 to 50 gm/l nickel chloride ($\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$) and 35 gm/l of boric acid (H_3BO_3). Subsequently NiCl_2 was replaced by 10 to 15 gm/l of NaCl, since preliminary tests showed that this change does not affect the quality of the deposit or levelling action. The temperature was maintained at 50°C and current density was 4 to 6 A/dm² except when investigating the influence of these parameters. Coumarin (lactone of o-hydroxycinnamic

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Bright nickel plating with...

acid, $C_9H_6O_2$) was tested as a levelling agent, for which ethyl alcohol or glacial acetic acid were used as solvents. As specimens, pieces of thin sheets of copper, brass and steel in flat and cylindrical shapes were used. As a criterion of levelling, the formula used by the Czechoslovak Institute for Metals Protection im. Akimov, was adopted. (Eq. 1). where h'_1 and h'_2 - depth of roughness before and after plating. X

$\frac{h'_1 - h'_2}{h'_1} \cdot 100\%$. The effect of Coumarin concentration is illustrated, 0.1 gm/l giving maximum levelling. This concentration, however, does not ensure maximum brightness and in choosing the Coumarin content, a compromise between these two effects must be made. To remove internal stresses and the tendency to pitting of the deposit (caused by Coumarin) other additives must be also used. Higher temperature of the bath tends to reduce internal stresses, but the increase of concentrations of such ions as NH_4 , Na, Mg, Co etc. tends to increase them. According to A.G. Samartsev and Yu. V. Lyzlov (Ref. 7: Vnutrenniye napryazheniya v elektroliticheskikh osadkakh nikelya,

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Bright nickel plating with...

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Trudy 1-y nauchno-tekhnicheskoy konferentsii po voprosam intensifikatsii proizvodstva i povysheniya kachestva gal'vanicheskikh pokrytiy, Kiyev - Odessa 1956), the increase of the pH value from 6 to 6.1 or 6.2 produces a sharp increase in internal stresses. Various organic additives influence current consumption and coumarin was tested in this respect. Even small amounts of coumarin were found to increase deposit hardness. To increase the brightness of the deposit and to reduce internal stresses, 2 gm/l of para-toluolsulphamide was added which had the best effect with 1.5 gm/l of coumarin (Fig. 5).

Fig. 5. Legend: Effect of coumarin content on the nickel deposit brightness 1 - current density of 4 A/dm². 2 - of 4 to 6 A/dm².

An electric method, worked out by G.K. Potanov and A.T. Sandzherovskiy (Ref. 10: ZhFKh, t.XXXII, vyp. 6, 1958), was used for measuring

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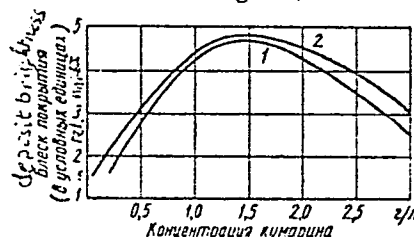


Рис. 5. Влияние содержания кумарина на блеск никелевых покрытий:
1 - плотность тока 4 а/дм²; 2 - 6 а/дм².

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S/122/61/000/006/004/011

D244/D301

Bright nickel plating with...

internal stresses. This method depends on measuring the bending of the cathode under the stress in the deposit. To prevent pitting, surface active substances such as sodium lauryl sulphate (0.2 to 1.0 gm/l) or a wetting agent which reduces surface tension to 30 dyne/cm., can be added. On the basis of the investigations made, it can be concluded that:

- 1) Coumarin has a high levelling action but does not give a bright deposit and causes a marked increase of internal stress and pitting.
- 2) Paratoluolsulphamide in a bath containing coumarin produces a bright and tension free deposit.
- 3) Addition of D-10 (D-10, sodium alkyl sulphate) in the amount of 0.07 gm/l ensures absence of pitting.
- 4) For bright nickel plating with a good levelling action the following electrolyte composition (gm/l) is recommended: Nickel sulphate ($\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$) 250-300; Sodium chloride (NaCl) 10-15; Boric acid (H_3BO_3) 35;

Coumarin 0.8-1.5; P-toluolsulphamide 2; Anti-pitting additive D-10 0.05-0.1; bath working conditions: temperature 50°C; pH = 4.3 to 5.3; current density 4 to 6 A/dm²; Rate of deposition 1 to 1.5 μ /min. There are 7 figures and 11 references: 7 Soviet-bloc and 4 non-Soviet-bloc.

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2:262

Bright nickel plating with...

S/122/61/000/006/004/011
D244/D301

The references to the English-language publications read as follows:
Ref. 4. S.A. Watson, J. Edwards, Electroplating and Metal Finishing
vol. 10, no. 5, 1957, p. 136; Ref. 8. J.B. Kushner, Techn. Prog. 45th
Annual Convnt. Amer. Electroplaters Soc. (Cincinnati, Ohio, 1958)
Newark, 1958, 28-32, 158-161. Ref. 9. D.J. Fishlock, 'Product Finishing'
Vol. 11, 1958, no. 3, 1-5. Ref. 11. E.B. Shubert, 'Plating', 1958,
45, no. 9.

X

Card 5/5

88507

18.7400

S/149/61/000/001/013/013
A006/A001

AUTHORS: Layner, V.I., Sukhacheva, S.V.

TITLE: Titanium Galvanizing

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya,
1961, No. 1, pp. 140 - 146

TEXT: Galvanizing of titanium and its alloys is difficult due to the presence of an oxide film on the Ti surface, preventing stable cohesion of Ti with the galvanic coating. Various methods have been proposed to eliminate the oxide film and to prevent its repeated formation (Ref. 1-8). The authors checked the methods published in literature and studied the method of chemical processing with an ethylene glycol - hydrogen fluoride - zinc fluoride mixture. Experiments were made with VT-1 (VT-1) specimens obtained by magnesium thermal process and containing in %: 0.31 O₂; 0.22 Fe; 0.089 C; 0.05 Si; 0.029 N; 0.005 H₂. After degreasing and washing, the specimens were etched in a mixture of HNO₃:HF = 3 : 1 until the appearance of a bright semi-lustrous surface. After washing they were placed at room temperature in a solution of 800 m³ ethylene glycol, 200 cm³ HF (48%) and 100 g ZnF₂. Multiple experiments have shown that a uniform dark gray film is

Card 1/6

Titanium Galvanizing

88507

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A006/A001

obtained when a certain sequence of placing the components in the solution for activation is observed: ethylene glycol \rightarrow HF \rightarrow ZnF₂. The film thus formed prevents repeated oxidation of Ti and represents an intermediate layer for the application of strongly adherent galvanic coatings. It was found that best cohesion of titanium with the galvanic coating was obtained by extended chemical processing of titanium for 1.5 - 4.5 minutes at 15 - 24°C. Copper plating of chemically processed titanium was made in cyanide electrolyte at a current density of 1.5 amp/dm² at 40°C for 10 minutes. It was found that a decisive effect on the cohesion strength of Ti with Cu was exerted by the content of free cyanide in the electrolyte. The optimum amount of NaCN = 6.7 - 8.3 g/l (Figure 3). Annealing increased considerably the cohesion strength. After 10 - 30 minutes heating at 500°C copper-plated Ti specimens underwent bending until fracture without showing sealing of the copper coating. Ti specimens with a 35 micron thick copper coating were annealed at 200 and 500°C, soldered together and tested on an Amsler tensile testing machine. It was found that the cohesion of the coating with Ti was better after annealing at 500 than at 200°C. Resistance to gas corrosion was investigated with uncoated Ti specimens, specimens coated with Ni on a copper underlayer, and with Cr on a copper-nickel underlayer. The thickness of the coating was 20 micron for copper, 10 micron for nickel and 5 micron for chromium. Uncoated titanium oxidized

Card 2/6

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Titanium Galvanizing

S/149/61/000/001/013/013
A006/A001

slowly, but the gain in weight increased linearly; oxidation of nickel-plated Ti was intensified the beginning, but the oxidation rate decreased sharply after 120 minutes; a 5-micron chromium coating on a copper-nickel underlayer protects Ti against gas corrosion at 700°C. A copper coating can be successfully used as an underlayer for the subsequent deposition of Ni, Cr and other metals.

✓

Card 3/6

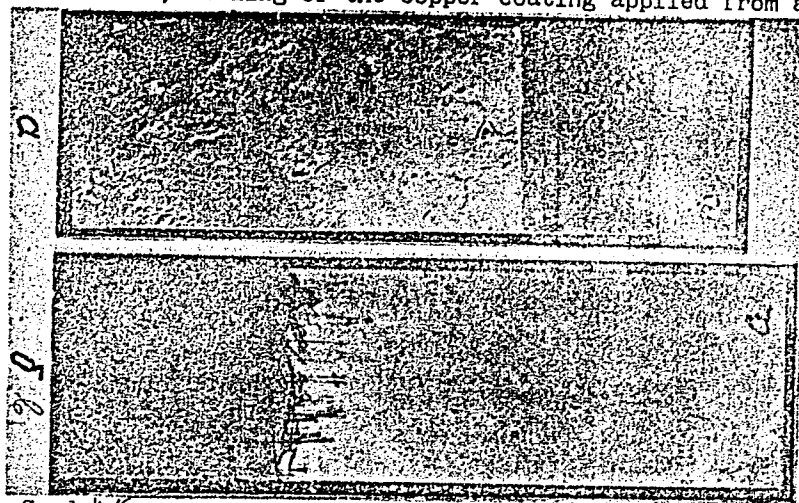
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Titanium Galvanizing

S/149/61/000/001/013/013
A006/A001

Figure 2

Results of tests with chemically processed titanium after 30 minutes heating at 240°C: a) scaling of the copper coating applied from an acid electrolyte on the dark film on titanium;



c - copper-plated from cyanide electrolyte on the dark film on titanium;
c - nickel-plated titanium (on copper from a cyanide + acid electrolyte); d - chrome plated titanium on a copper-nickel underlayer.

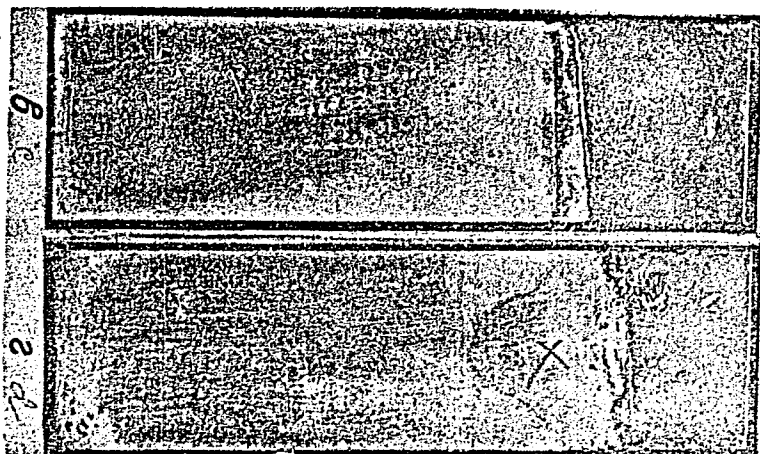
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Titanium Galvanizing

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A006/A001

Figure 2 continued



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S/149/61/000/001/013/013
A006/A001

Titanium Galvanizing

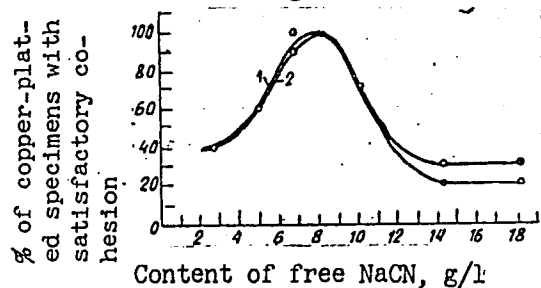


Figure 3: The effect of free cyanide content in copper electrolyte on the cohesion strength of the coatings with titanium: 1 - in a copper plating bath; 2 - after 30 minutes heating at 200°C.

There are 5 figures and 9 references: 6 Soviet, 2 English and 1 French.

ASSOCIATIONS: Krasnoyarskiy institut tsvetnykh metallov (Krasnoyarsk Institute of Non-Ferrous Metals); Kafedra elektrokhimii i korrozii (Department of Electrochemistry and Corrosion)

SUBMITTED: March 1, 1960

Card 6/6

LAYNER, V.I.

Ways to save nickel in protective and decorative finishing of
metal parts. Izv. vys. ucheb. zav.; tsvet. met. 4 no.6:92-
98 '61. (MIRA 14:12)

1. Krasnoyarskiy institut tsvetnykh metallov, kafedra elektrokhimii
i korrozii.

(Nickel plating)

(Metals...Finishing)

LAYNER, V.I., prof., doktor tekhn.nauk

Electrolytic polishing of aluminum reflectors in alkaline. Vest mash.41
no.3:39-42 Mr '61.

(MIRA L.3)

(Electrolytic polishing)

BELEN'KIY, M.A., inzh.; LAYNER, V.I., doktor tekhn.nauk, prof.; PETROVA, O.A.,
kand.tekhn.nauk

Bright nickel plating with equalizing additions. Vest. mash. 41
no.6:37-41 Je '61. (MIRA 14:6)
(Nickel plating)

LAYNER, Vladimir Il'ich; ARKHANGEL'SKAYA, M.S., red. izd-va;
ISLENT'YEVA, P.G., tekhn. red.

[Purification of waste waters in metallurgy] Voprosy obezvrezhi-
vaniia stochnykh vod v metallurgizdat, 1962. 65 p.

(MIRA 16:1)

(Metallurgical plants--Water supply)
(Sewage--Purification)

S/122/62/000/009/001/003
ACC6/A101

AUTHORS: Layner, V. I., Professor, Doctor of Technical Sciences,
Velichko, Yu. A., Engineer

TITLE: Silver plating of aluminum

PERIODICAL: Vestnik mashinostroyeniya, ⁴²no. 9, 1962, 45 - 48

TEXT: An experimental investigation on the silver plating of Al was performed for the purpose of raising the electric conductivity of Al and to extend its use as an electric conducting material. Its poor electric conductivity is due to the formation of an oxide film on the Al surface and to the possibility of corrosion. Various methods of silver plating were tested. Best cohesion of the silver coating with Al was obtained by silver plating zinc-plated Al in two preliminary and one basic baths. Zinc plating is carried out in a solution containing in g/l: ZnO 40 - 45, NaCN 50 - 80, NaOH 60 - 80, Na₂S 3 - 5, gelatin 0.5 - 5; bath temperature 17 - 25°C; current density 1 amp/dm², time 5 - 10 min.; thickness of the coating 2 - 3 μ. The first and second preliminary silver-plating solutions contain AgCN 1 and 5.3, KCN 90 and 67.5 g/l respectively; current density 1.5 - 2.5 amp/dm²; temperature 25 - 27°C; time 10 - 12 sec. The basic bath contains in g/l: AgCN 30, KCN 55.5, KCN (free) 41.9, K₂CO₃ 45; current density 0.5 amp/dm², bath temperature 25 - 27°C. Card 1/2

Silver plating of aluminum

3/122/62/000/009/001/001
A006/A101

temperature 35 - 37°C; current efficiency 98%. The thickness of the silver coating varies between 50 μ for heavy duty and 15 - 20 μ for easy operational conditions. Corrosion tests were performed in a corrosion chamber of the laboratory of coating at the Moscow Plant imeni I. A. Likhachev. It was found that an effective protection of silver-plated aluminum against corrosion is assured by insulating the Al from the effect of the surrounding medium, i.e. the coating must be poreless. Poreless coatings are obtained by applying 25 to 50 μ thick silver by silver layers on a 50 - 80 μ thick copper under-layer. The Cu layer is applied in an electrolyte of the following composition: in g/l CuCN 40 - 42, NaCN 15 - 18, NaCN (free) up to 3.8, Na_2CO_3 30 - 40, $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$ 40 - 60. Bath temperature 38 - 40°C, pH 10.2-10.5; current intensity 2.5 amp/dm², for 2 minutes and 1 amp/dm² for 3 - 5 minutes. There are 3 figures and 1 table.

Card 2/2

ACCESSION NR: AT4001241

S/3031/63/000/035/0267/0276

AUTHORS: Layner, V. I.; Velichko, Yu. A.

TITLE: Electrolytic deposition of heavy dense rhodium layers

SOURCE: Gosudarstvennyy institut tsvetnykh metallov. Sbornik nauchnykh trudov. Moscow, no. 35, 1963, 267-276

TOPIC TAGS: rhodium electrolytic deposition, electroplating, rhodium, rhodium plating

ABSTRACT: The purpose of the research was to develop a technology for obtaining structurally satisfactory well-adhering rhodium coatings up to 50 microns thick, particularly for the electronic industry, since earlier techniques were confined to thicknesses not exceeding 2 microns. Test results have shown that satisfactory rhodium coatings are obtained in a wide range of current densities from sulfuric-acid electrolytes which contain no chlorine ions. The

Card 1/2

ACCESSION NR: AT4001241

attainable current density in rhodium electrolytes increases with the rhodium contents; the sulfuric acid concentration in the electrolytes can fluctuate over a wide range, 50--200 grams per liter and above. The yield of rhodium per unit current increases with the rhodium content in the electrolyte and with increasing temperature, and decreases with increasing sulfuric acid concentration and current density. Dense rhodium coatings without cracks can be obtained only if selenic acid is present in the electrolyte in addition to the main components (sulfuric acid and rhodium sulfate). The recommended electrolyte composition and conditions for dense rhodium coatings of sufficient thickness is: 50--250 grams per liter of H_2SO_4 , 2--4 grams per liter H_2SeO_4 , 10--60 grams per liter of Rh, temperature 50--60°, current density up to $10A/dm^2$. Orig. art. has: 9 figures and 1 table.

ASSOCIATION: Gosudarstvennyy institut tsvetnykh metallov (State Institute of Nonferrous Metals)

Card 2/3

LAYNER, V.I.;BARDINA, V.A.

Copper plating from pyrophosphate electrolytes. Izv. vys. ucheb. zav.;
tsvet. met. 6 no.3:144-150 '63. (LINA 16:9)

1. Moskovskiy institut stali i splavov, kafedra korrozii metallov.
(Copper plating)

LAYNER, V.I., prof.

Electrochemical platings of light and refractory metals and alloys. Zhur. VKHO 8 no.5:538-544 '63. (MIRA 17:1)

S/C80/63/036/001/013/026
D226/D307

AUTHORS: Layner, V.I. and Yü Tsu-Jan

TITLE: Some laws relating to the electrolytic deposition of alloys

PERIODICAL: Zhurnal prikladnoy khimii, v. 36, no. 1, 1963, 121 - 129

TEXT: The present article is a review, based largely on Soviet work, aimed at illuminating some regularities which may be used in predicting the compositions of codeposited alloys and in determining the dependence of such alloy compositions on conditions of deposition. The work was motivated by the absence of a fundamental theory embracing the electrolytic codeposition of alloys, and by the growing interest in such processes, particularly in the Sn-Ni, Sn-Zn, Sn-Cd, Ni-Co, Fe-Ni etc. Factors affecting the relative rates of deposition are discussed. If the 2 compounds possess similar equilibrium potential and their polarization curves are effectively parallel, alloy composition may be controlled by

Card 1/2

Some laws relating ...

3/080/63/036/001/013/026
D226/D307

conditions of electrolysis and concentration of the salts in the electrolyte. In the case of electrolysis from solutions of metallic complexes, the critical factor appears to be the concentration of the complex former which affects the cathodic polarization of the 2 codeposited metals in a different manner. Examples of these systems are given. It is shown that the rates of deposition are largely dependent on changes of the zero-charge potential, (φ_0), especially when the difference between φ_0 's of the individual components is relatively large and if the delayed discharge theory of Frumkin is taken as valid. Thus during codeposition of 2 metals, displacement of the φ_0 of the alloy (on the cathode) towards more electro-negative values will lead to a retardation of the deposition of the ion whose φ_0 is relatively more positive. Deposition of the component possessing less positive φ_0 is therefore favored. This is illustrated by several examples, and factors affecting φ_0 are considered in brief. There are 9 figures.

SUBMITTED: October 3, 1961

Card 2/2

LAYNER, V.I.; YUY TSZU-ZHAN' [Yü TSu-jan]

Cathodic polarization during the electrolytic deposition of a lead-tin alloy. Zhur.prikl.khim. 36 no.2:350-356 F '63. (MIRA 16.2)
(Lead-tin alloys) (Electroplating) (Polarization(Electricity))

LAYNER, V.I., doktor tekhn.nauk, prof.; YUY TSZU-ZHAN' [Yü Tsu-jan], inzh.

Electrolytic bronzing of steel parts. Vest.mashinostr. 43 no.5:
39-43 My '63. (MIRA 16:5)
(Bronzing)

BOGOYAVLENSKAYA, N.V.; LAYNER, V.I., doktor tekhn. nauk, prof.,
retsensent; KARGANOV, V.G., inzh., red.

[Electrochemical treatment of pipe] Elektrokhimicheskaja
obrabotka trub. Moskva, Mashinostroenie, 1964. 135 p.
(MIRA 17:11)

L 17943-65 EWT(m)/EPF(n)-2/EWP(t)/EWP(b) Pu-4 LJP(c)/ASD(m)-3/ASD(f)-2 JD/
 ACCESSION NR: AP4047495 JG S/0149/64/000/004/0142/0146

AUTHOR: Kvokova, I.M.; Layner, V.I.

TITLE: Electrolytic deposition of rhenium coatings on molybdenum
and tungsten

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 4, 1964, 142-146

TOPIC TAGS: rhenium, molybdenum, tungsten, rhenium coating,
 rhenium coating deposition, electrolytic deposition

ABSTRACT: A number of rhenium-containing electrolytes were tested in an effort to obtain satisfactory-quality rhenium coatings on molybdenum and tungsten. The best results were obtained with electrolytes containing either 60 g/l HReO_4 , 40 g/l H_2SO_4 , and 30 g/l $(\text{NH}_4)_2\text{SO}_4$ or 12 g/l KRO_4 , 60 g/l H_2SO_4 , and 100 g/l $(\text{NH}_4)_2$ at room temperature and a current density of 20 a/dm². Molybdenum or tungsten surfaces had to be pickled prior to coating in 15% NaOH solution with alternating current at a current density of 30 a/dm². Under these conditions, rhenium coatings, 2μ thick and sufficiently dense, with good adhesion to the base metal were obtained. Efforts

Card 1/2

L 17943-65

ACCESSION NR: AP4047495

to obtain coatings with a thickness in excess of 2μ failed; with prolonged electrolysis, the coating became nonuniform and began to peel off. Heavier coatings could be obtained only by depositing several layers, each 2μ thick, with annealing of each layer in inert gas at 800 C or 1000 C for 20 or 10 min, respectively, prior to depositing the rest layer. Orig. art. has: 4 figures.

ASSOCIATION: Moskovskiy Institut stali i splavov. Kafedra korrozii i zashchity metallov. (Moscow Institute of Steel and Alloys. Department of Corrosion and Protection of Metals)

SUBMITTED: 17Dec63

ENCL: 00

SUB CODE: MM

NO REF SOV: 004

OTHER: 007

Card 2/2

L 19010-55 FWT(m)/EFT(n)-2/EWA(d)/EWP(t)/EWP(b) Pa-4 IJP(c)/SSD/AFTC(p)/
ASD(f)-2/ASD(m)-3 JP/JC/WB
ACCESSION NR: AP5000143
AUTHOR: Kvakova, I. M.; Layner, V. I.
S/0149/64/000/005/0129/0134

TITLE: Protection of molybdenum⁷ and tungsten against high-temperature
gas corrosion by the electrolytic deposition of coatings⁶

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 5, 1964, 129-134

TOPIC TAGS: molybdenum, tungsten, electroplating, chromium, nickel,
corrosion, corrosion prevention, oxidation, oxidation prevention

ABSTRACT: Experiments have been conducted to determine the most
effective conditions of electroplating of molybdenum and tungsten
with chromium and nickel to protect the base metals from oxidation and
gas corrosion at 1100-1200C. Satisfactory-quality coatings were
obtained by a thorough electrochemical cleaning of the molybdenum and
tungsten specimens and by first depositing a chromium sublayer from
an electrolyte containing 250 g/l CrO₃ and 2.5 g/l H₂SO₄ at 70C with
a current density of 30 amp/dm². On this chromium² sublayer, which is
free of porosity, is sufficiently ductile, and has a good adhesion to

Card 1/2

L 19040-65

ACCESSION NR: AP5000143

the base metal, a nickel coating is deposited in two stages: at first a thin nickel layer 4—5 μ thick is deposited in a chloride electrolyte (to prevent the passivation of chromium), then a heavier nickel layer 60—200 μ thick, in a conventional electrolyte. The procedure described ensures high-quality, dense, chromium-nickel coatings of molybdenum and tungsten, which adequately protect the base metals from oxidation and gas corrosion. Orig. art. has: 5 figures.

ASSOCIATION: Moskovskiy institut stali i splavov, Kafedra korozii i zashchity metallov (Moscow Institute of Steel and Alloys, Department of Corrosion and Protection of Metals)

SUBMITTED: 10May63

ENCL: 00

SUB CODE: MM

NO REF SOV: 10Dec64

OTHER: 004

ATD PRESS: 3157

Card 2/2

L 17844-65 EWT(m)/EPF(n)-2/EWA(d)/ENP(t)/ENP(k)/ENP(b) Pf-h/Pad/Pu-h
IJP(c)/ASD(f)-2/ASD(m)-3 JD/HW/JG/WB
ACCESSION NR: AP4048367 S/0032/64/030/011/1363/1364

AUTHOR: Kvokova, I. M.; Layner, V. I.

TITLE: Method of oxidation testing coated molybdenum

SOURCE: Zavodskaya laboratoriya, v. 30, no. 11, 1964, 1363-1364

TOPIC TAGS: molybdenum, coated molybdenum, oxidation, resistance

ABSTRACT: A method has been introduced for testing the oxidation resistance of protective coatings on molybdenum specimens by heating the specimens with electric current. Uncoated molybdenum wires 2 mm in diameter withstood 20 min at 700C and 5 min at 800C, whereas specimens coated with chromium withstood 3-8 hr at 700C, depending on coating conditions. Nickel coating, 180 μ thick protected molybdenum at 800C for more than 100 hr. During this time only Ni was oxidized. Orig. art. has: 2 figures.

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute of Steel and Alloys).

Card

1/2

L 17844-65

ACCESSION NR: AP4048367

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NO REF SOV: 000

OTHER: 000

ATD PRESS: 3153

Card 2/2

ACCESSION NR: APL0114610

AUTHOR: Layner, V. I. (Doctor of technical sciences, Professor)

TITLE: Low voltage deposition of nickel layers by sulfamino electrolytes

SOURCE: Vestnik mashinostroyeniya, no. 1, 1964, 32-36

TOPIC TAGS: nickel deposition, electrolyte, sulfamino acid, pitting, surface tension, internal stress, microhardness, current density

ABSTRACT: The conditions for controlling and improving nickel deposition from various electrolytes were studied. The primary electrolyte used was sulfamino acid (HSO_3NH_2). To minimize pitting caused by this electrolyte a 3 ml/liter addition to a sodium alkylsulfate solution (trade name "Progress") was found to be helpful. The action of this solution is a lowering of electrolyte surface tension from 76.8 to 47.5 dynes/cm. The addition of 2 g/liter of paratoluene-sulfamide further reduces tension to zero and diminishes internal stresses developed in the deposit. In any case, a lower internal stress is observed in the deposit with sulfamino electrolyte than with sulfuric acid. The microhardness of a nickel coating in sulfamino electrolyte is between 300-400 kg/mm^2 at 40C, and it is found to

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ACCESSION NR: AP4014610

increase linearly with the current density. Increasing the temperature, on the other hand, considerably decreases the microhardness. For best results it is recommended to use an electrolyte with 280-300 g/liter $\text{Ni}(\text{SO}_3\text{NH}_2)_2$; 30 g/liter H_3BO_3 ; 15 g/liter NaCl ; 3 ml/liter "Progress"; 2 g/liter paratoluena-sulfamide and $\text{pH} = 4.5$. The electrolysis range should be within 400 temperature and 5 amp/dm². Orig. art. has: 8 figures and 2 tables.

ASSOCIATION: none

SUBMITTED: 00

ENCL: 00

SUB CODE: MM

NO REF SOV: 003

OTHER: 009

Card 2/2

KVOKOVA, I.M.; LAYNER, V.I.

Molybdenum and tungsten protection from high temperature gas
corrosion by electroplating. Izv. vys. ucheb. zav., tsvet. met.
7 no.5:129-134 '64 (MIRA 18:1)

1. Kafedra korrozii i zashchity metallov Moskovskogo instituta
stali i splavov.

KVOKOVA, I.M.; LAYNER, V.I.

Method of testing the heat resistance of protected molybdenum.
Zav. lab. 30 no.11:1363-1364 '64 (MIRA 18:1)

1. Moskovskiy institut stali i splavov.

L 56025-65 EWT(m)/EWP(1)/EWA(d)/EWP(t)/EWP(z)/EWP(b) IJP(c) MJW/JD
 UR/0149/65/000/002/0147/0150
 621.785
 29
 28
 8

AUTHOR: Usova, V. V.; Layner, V. I.

TITLE: Effect of heat treatment on the adhesion strength of electrolytic copper
and nickel coatings to titanium ✓

SOURCE: IVUZ. Tsve-naya metallurgiya, no. 2, 1965, 147-150

TOPIC TAGS: titanium, titanium plating, electroplating, adhesion, coating adhesion,
 adhesion strength, copper coating, nickel coating/VT titanium

ABSTRACT: The effect of heat treatment on the adhesion strength of electrolytic copper or nickel coatings to VT-1 titanium has been investigated. It was found that the adhesion strength of the "as deposited" copper, 120 kg/cm², can be increased to 325 kg/cm² by annealing at 500C for 10 min. Similarly, annealing at 450C for 30 min increases the adhesion strength of nickel coatings from 100-120 kg/cm² to over 250 kg/cm². This increase in adhesion strength is a result of the formation of a diffusion layer at the interface of the base metal and coating. Increasing the annealing temperature to over 400-500C leads to the formation of brittle inter-metallic compounds, which decrease the strength of adhesion. Orig. art. has: 6
 5 figures and 1 table. [ND]

Card 1/2

I 56025-65

ACCESSION NR: AP5016352

ASSOCIATION: Moskovkiy institut stali i splavov. Kafedra korrozii i zashchity
metallov (Moscow Institute of Steel and Alloys. Department of Corrosion and Metal
Protection)

SUBMITTED: 03Jan64

ENCL: 00

SUB CODE: MM

NO REF SOV: 008

OTHER: 005

ATD PRESS: 4034

Card

2/2

L 16097-66 EWT(m)/EWP(w)/T/EWP(t) IJP(c) JD/HW/JG

ACC NR: AP5022658

SOURCE CODE: UR/0365/65/001/005/0511/0514

AUTHOR: Kozlova, G. V.; Layner, V. I.

49
45
B

ORG: Moscow Institute of Steel and Alloys (Moskovskiy institut stali i splavov)

TITLE: Electro-deposition of the platinum-rhodium alloy from a salt-acid electrolyte

SOURCE: Zashchita metallov, v. 1, no. 5, 1965, 511-514

TOPIC TAGS: copper, platinum base alloy, rhodium containing alloy, chemical resistant material, heat resistance, hardness

ABSTRACT: ²⁷Platinum-rhodium alloy has a higher chemical and heat resistance than metallic platinum, but metal alloys with satisfactory properties can be produced only with a concentration of rhodium $\leq 10\%$. The experiments were made on the electrodeposition of an alloy from an electrolyte containing various amounts of chloroplatinous acid, rhodium chloride, and hydrochloric acid. The Pt:Rh ratios

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UDC: 621.357.7

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L 16097-66

ACC NR: AP5022658

4

in the bath during the experiments were 1:1, 1:2, and 1:3. A well-adhering alloy coating was produced on the copper foil, coated preliminarily with an 0.5 - 1 μ layer of platinum in an aminonitrite electrolyte. The platinum-rhodium alloys produced electrolytically contained 45 - 75% Rh. The increase in concentration of rhodium in the electrolyte resulted in an enrichment of the alloy with rhodium, but it decreased the current yield of the alloy. The increase in concentration of hydrochloric acid from 1.2 to 5.2 N. resulted in a decrease of the rhodium content in the alloy from 52.8 to 45.8% and in a decrease of current yield from 71.2 to 58.6%. The increase in temperature and stirring of the electrolyte enriched the alloy in rhodium and increased the current yield of the alloy by 0.1 - 1.5%. The composition of the alloy coating could be regulated by changing the relative amounts of rhodium and platinum in the electrolyte. The microhardness of the alloy containing 45 % Rh was 780 kg/sq cm. The porosity of the low thick coating was 7-10 pores/sq cm and that of the 20 coating was 1-2 pores/sq cm. Orig. art. has: 4 figures.

SUB CODE: 11, 13 SUBM DATE: 17Apr65/ ORIG REF: 003/ OTH REF: 004

Card 2/2 SYM

L 2117-66 EWT(m)/EWP(w)/EWP(i)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/JG
 ACCESSION NR: AP5022659 UR/0365/65/001/005/0515/0520
 621.357.7

AUTHOR: Kvokova, I. M.; Layner, V. I.

TITLE: Electrolytic deposition of heavy solid-rhenium layers

SOURCE: Zashchita metallov, v. 1, no. 5, 1965, 515-520

TOPIC TAGS: rhenium, electrolytic deposition, rhenium electrolytic deposition, molybdenum, rhenium chromium alloy, alloy electrolytic deposition

ABSTRACT: Experiments have been conducted to determine why only very thin rhenium layers can be electrolytically deposited on molybdenum. Numerous attempts to deposit heavier layers in one step without intermediate annealing failed. It is believed that the low overvoltage of hydrogen on rhenium leads to the absorption of hydrogen, which in turn causes cracking of rhenium deposits whenever their thickness exceeds 2 μ . Due to cracks in the rhenium deposits, they loosen from the molybdenum base. Rhenium layers 6-8 μ thick are at present obtained under production conditions by gradual build up, with each layer, 1-2 μ thick,

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ACCESSION NR: AP5022659

annealed after deposition at 800—1000C for 15—60 min in a protective hydrogen atmosphere. Experiments with the deposition of rhenium-chromium alloy revealed that chromium reduces the lattice parameters of rhenium, forms a substitutional solid solution with rhenium, and increases the dislocation density. Crystals of chromium-rhenium alloy deposits have a more regular shape and are larger than those of rhenium deposits. No cracks were observed in alloy deposits up to 10 μ thick. However, these deposits adhere tightly only to copper or nickel, and not to molybdenum. Orig. art. has: 4 figures and 2 tables. [ND]

ASSOCIATION: Moskovskiy institut stali i splavov (Moscow Institute of Steel and Alloys)

SUBMITTED: 29Jan65

ENCL: 00

SUB CODE: MM, 6c

NO REF SOV: 007

OTHER: 001

ATD PRESS: 4117

Card 2/2

L 10696-66 EWT(m)/ETC/EPF(n)-2/ENG(m)/EWP(t)/EWP(z)/EWP(b) IJP(c) JD/HW/JG/WB/GS
 ACC NR: AT5027946 SOURCE CODE: UR/0000/65/000/000/0100/0107

AUTHOR: Kvokova, I. M.; Layner, V. I.

ORG: none

88
85
B+1

TITLE: Oxidation-resistant electroplated coatings on molybdenum and tungsten

SOURCE: Seminar po zharostoykim pokrytiyam. Leningrad, 1964. Zharostoykiye pokrytiya (Heat-resistant coatings); trudy seminar. Leningrad, Izd-vo Nauka, 1965, 100-107

TOPIC TAGS: molybdenum, tungsten, oxidation, molybdenum oxidation, tungsten oxidation, oxidation inhibition, chromium plating, nickel plating, oxidation resistant coating, chromium nickel coating

ABSTRACT: Experiments have been made to determine the best conditions for chemical and electrochemical deposition of oxidation-resistant chromium-nickel coatings on molybdenum and tungsten. The electrochemical preparation of the surfaces to be plated was more effective than the chemical. Both molybdenum and tungsten were pickled in 15% NaOH for 3-5 min at an alternating current density of 35-40 amp/dm² and a voltage of 15-20 v. Chromium plating was done in a standard electrolyte (250 g/l CrO₃, 245 g/l H₂SO₄) at 70C and a current density of 30 amp/dm², or in an electrolyte containing 250 g/l CrO₃ and 0.75-1.5 g/l H₂SO₄ at room temperature and a current density of 30 amp/dm². Under these conditions, a dense, fairly sound, tightly adhering, chromium coating without porosity or a crack network were obtained.

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L 10696-66

ACC NR: AT5027946

3

Strong adhesion of nickel to chromium²¹ was achieved by activation of the chromium coating in 50% HCl for 10—20 sec at room temperature. Nickel coating was deposited in two stages. The first coating, 4—5 μm thick, was deposited in an electrolyte containing 250 g/l NiCl_2 and HCl to the pH = 1, at room temperature and a current density of 2.5 amp/ dm^2 . The main nickel coating, 60—400 μm thick, was deposited in a standard sulfuric acid electrolyte with a pH of 5.5 at 45C and a current density of 2.5 amp/ dm^2 . A nickel coating 180 μm thick protects molybdenum from oxidation at 900C for 300 hr. Diffusion of molybdenum into nickel coating can be appreciably delayed by plating a 20—40 μm thick layer of silver or gold on the chromium substrate, followed by chromium and nickel plating to a thickness of 30 and 60 μm , respectively. Orig. art. has: 5 figures.

[MS]

SUB CODE: 11, 13/ SUBM DATE: 20Jul65/ ORIG REF: 002/ OTH REF: 003/ ATD PRESS:

4161

HW
Card 2/2

USOVA, V.V.; LAYNER, V.I.

Effect of heat treatment on the strength of cohesion of
electroplated copper and nickel with titanium. Izv.vys.
ucheb.zav.; tsvet.met. 8 no.2:147-150 '65.

(MIRA 1961)

1. Kafedra korrozii i zashchity metallov Moskovskogo instituta
stali i splavov. Submitted January 3, 1964.

L 10986-66 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD

ACC NR: AP6000004

UR/0080/65/038/011/2473/2479

AUTHOR: Layner, L.V.; Layner, V.I.; Baronova, Z.A. 29

ORG: None

TITLE: Chemical polishing and etching of single silicon crystals for exposure of dislocations

SOURCE: Zhurnal prikladnoy khimii, v.38, no.11, 1965, 2473-2479

TOPIC TAGS: crystal dislocation, silicon single crystal, metallography

ABSTRACT: Two ternary systems were investigated in the experiments: HF-HNO₃-H₂O and HF-CrO₃-H₂O. The system HF-HNO₃-H₂O was used to establish the optimum region for the polishing of a silicon single crystal, and the system HF-CrO₃-H₂O for the optimum region for etching to expose dislocations. The effect of concentration of individual components of the HF-HNO₃-H₂O system on the quality of the polished surface was determined by setting up a triangular concentration diagram. The diagram was constructed with data from the study of 230 tested solutions and is given in the article. A figure shows the dependence of the rate of solution of silicon with an increase in the concentration of HNO₃ and the decrease in the concentration of HF with a varying amount of added water. For exposure of dislocations, the authors studied the etching of

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UDC: 621.357.8 + 621.315.592

L 10986-66

ACC NR: AP6000004

chemically polished silicon in the mixture $\text{HF-CrO}_3\text{-H}_2\text{O}$. These experimental data are also exhibited in the form of a triangular diagram. It was established that the rate of solution of silicon in the optimum regions of the system $\text{HF-HNO}_3\text{-H}_2\text{O}$ is approximately 100 times greater than in the corresponding regions of the system $\text{HF-CrO}_3\text{-H}_2\text{O}$. Orig. art. has: 7 figures. 0.

SUB CODE: 07,11/
20 SUBM DATE: 22Apr64/ ORIG REF: 001/ OTH REF: 004

Card

2/2

L 21544-66 EWT(m)/EWP(t) IJP(c) JD/HW/JG

ACC NR: AP6007909

SOURCE CODE: UR/0149/66/000/001/0148/0152

16
13

AUTHOR: Bakhvalov, G. T.; Layner, V. I.; Maslennikova, A. S.

ORG: Moscow Steel and Alloys Institute. Department of Metal Corrosion (Moskovskiy institut stali i splavov. Kafedra korrozii metallov)

TITLE: Heavy platinum plating of nickel and molybdenum

58 27 4455 18. 4455 27 4455 27
SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 1, 1966, 148-152

TOPIC TAGS: platinum plating, nickel platinum plating, molybdenum platinum plating

ABSTRACT: Conditions of electroplating nickel and molybdenum with platinum to protect the former against gas corrosion at 600—800C or aggressive chemical media has been studied. The strongest bond between platinum and nickel was obtained when the nickel was thoroughly degreased and when the electro-deposition of platinum was performed with periodic reversal of current. Electrolysis without current reversal yielded coatings which were porous at thicknesses over 30 μ . Coatings obtained with reversed current with a cathodic and anodic period of 10 and 1.5 sec or 5 and 1.5 sec were 28 or 26 μ thick, and had no porosity. Platinum-plated nickel specimens were tested at 650C for 50 hr. Specimens which had a platinum layer at least 28 μ thick retained a strong bond between platinum and nickel. A strong bond between molybdenum

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L 21544-66

ACC NR: AP6007909

0

and platinum could not be achieved. Therefore, molybdenum was first chromium plated, then nickel plated, and then platinum plated. The three-layer plating protected molybdenum against oxidation at temperatures up to 800C for up to 15 hr. Orig. art. has: 2 figures. [AZ]

SUB CODE: 11, 13/ SUBM DATE: 29Jun64/ ORIG REF: 002/ OTH REF: 004/ ATD PRESS:

4219

Card 2/2 BLG

L 28067-66 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6015289

(N)

SOURCE CODE: UR/0365/66/002/003/0331/0335

AUTHOR: Usova, V. V.; Layner, V. I.

ORG: Moscow Institute of Steel and Alloys (Moskovskiy institut stali i splavov)

TITLE: The activation of titanium surface prior to electroplating

SOURCE: Zashchita metallov, v. 2, no. 3, 1966, 331-335

TOPIC TAGS: titanium, titanium electroplating, titanium activation

ABSTRACT: The chemical and phase composition of the surface layer formed on titanium during activation in a mixture of ethylene glycol, 48% hydrofluoric acid, and zinc fluoride has been investigated. The investigation showed that the activated layer consists of titanium hydride and zinc hydride. The weight of the layer depends on the duration of activation and the concentration of hydrofluoric acid, and varies from 0.1—0.4 mg/cm². The hydrogen content of the layer depends on the temperature of activation and the concentration of the hydrofluoric acid. For instance, at a hydrofluoric acid concentration of 90 g/l and a temperature of 14 or 30C the respective hydrogen content is 0.059% or 0.017%. At an acid concentration of 70 g/l, the corresponding figures are 0.027 and 0.0084%. The optimum conditions of activation were found to be: hydrofluoric acid concentration 75—95 g/l, temperature 16—20C, maximum duration of treatment 2 min. The layer formed at 30C is rich in zinc, poor in hydrogen, and is loose to such an extent that it is washed away during

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UDC: 621.357.7

L 28067-66

ACC NR: AP6015289

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rinsing. All the factors which promote the increase of hydrogen content in the surface layer improve the adhesion of copper plating to titanium. The potential of activated titanium reaches a value of minus 0.78—0.8V in 2—3 sec and then remains almost constant. -Orig. art. has: 4 figures. [WW]

SUB CODE:11, 13/SUBM DATE: 07Jun65/ ORIG REF: 005/ OTH REF: 001/ ATD PRESS:4261

Card

2/2

CC

ACC NR: AP7000016

SOURCE CODE: UR/0080/66/000/011/2505/2509

AUTHOR: Layner, V. I.; Velichko, Yu. A.; Zuykova, V. S.

ORG: none

TITLE: Electrodeposition of a gold-antimony alloy

SOURCE: Zhurnal prikladnoy khimii, v. 39, no. 11, 1966, 2505-2509

TOPIC TAGS: gold alloy, antimony alloy, electrodeposition

ABSTRACT: The study was made in order to refine the basic parameters of the process of electrodeposition of hard gold coatings. The process involves alloying with antimony, which is introduced into the electrolyte in the form of antimonyl potassium tartrate ("tartar emetic"). The gold was deposited on brass and permalloy. On the latter, the electrodeposition is best carried out from cyanide solutions of the following composition (g/l): metallic gold 8.00, free KCN 15.0, $K(SbO)C_4H_4O_6 \cdot 0.5H_2O$ 0.05; current density, 0.3-0.7 A/dm²; temperature, 40°. The microhardness and wear resistance of the Au-Sb alloy are respectively 1.5 and 15 times greater than those of pure gold. A considerable increase in the concentration of antimonyl potassium tartrate (above 0.015 g/l) leaves the hardness of the Au-Sb alloy practically unchanged and has no effect on the Sb content of the alloy. An increase in the content of free KCN causes a temporary increase in the hardness of the pure gold coating, but does not affect the hardness of the Au-Sb alloy. A strong bonding between the latter and

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UDC: 541.13+546.3-19'59'86.541.13+546.3-19'59'86

ACC NR: AP7000016

permalloy is obtained by first depositing thin layers of copper in two pyrophosphate baths of different compositions. The liberation of pure gold is associated with considerable polarization. The introduction of antimonyl potassium tartrate has virtually no effect on the position and shape of the polarization curve recorded during the deposition of pure gold. An increase in the amount of free KCN and decrease in gold concentration shifts the polarization curve toward negative potentials. Orig. art. has: 9 figures.

SUB CODE: 07,11/ SUBM DATE: 04Nov64/ ORIG REF: 007/ OTH REF: 002

Card 2/2

KONTOROVICH, I. Ye.; LAYNER, Ye.V.

Standard nets of off-base projection axes for a hexagonal tightly packed lattice. Zav. lab. 31 no. 12:1480-1483 '65 (MIRA 19:1)

1. Moskovskiy vecherniy metallurgicheskiy Institut.

ACC NR: AP6034382

SOURCE CODE: UR/0149/66/000/005/0124/0128

AUTHOR: Kontorovich, I. Ye.; Layner, Ye. V.; Rastorguyev, L. N.

ORG: Moscow Evening Institute of Metallurgy (Moskovskiy vecherniy metallurgicheskiy institut)

TITLE: Effect of heat treatment on the texture of titanium alloys with electro-deposited chromium and nickel

SOURCE: IVUZ. Tsvetnaya metallurgiya, no. 5, 1966, 124-128

TOPIC TAGS: electrodeposition, metal grain structure, x ray diffraction analysis, chromium plating, annealing, nickel plating, cold rolling, titanium, titanium alloy / VT1 titanium, OT4 titanium alloy

ABSTRACT: Texture of VT1 commercial-grade titanium and OT4 titanium alloy cold rolled with 20—30% reduction and plated with chromium and nickel has been investigated. In the initial condition or after vacuum ($5 \cdot 10^{-4}$ Hg) annealing at 600, 700, or 800C for 30 min, x-ray diffraction patterns showed that the dispersion of texture in VT1 and OT4 alloy was more sharply expressed and the slope of the basis plane to the rolling plane was greater compared to the texture of titanium rolled with a reduction of 75—97%. Annealing increased the angle between the rolling and the basis planes in OT4 alloy, but the opposite effect was observed in VT1 alloy. The texture of electrodeposited chromium and nickel has axial characteristics. No structure relationship between the titanium base and the chromium layer was observed because

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UDC: 669.546.821.546 76.542.65.74

ACC NR: AP6034382

chromium was deposited on a hydrated titanium substrate which presented epitaxial growth. Orig. art. has: 2 figures and 3 tables.

SUB CODE: 11/ SUBM DATE: 19Jul65/ ORIG REF: 007/ OTH REF: 04/

Card 2/2

LAYNER, Yu.A.

Interfactory school on the exchange of progressive
practices in the use of fluid bed processes. TSvet.met.
33 no.5:80-82 My '60. (MIRA 13:7)

1. Institut metallurgii AN SSSR.
(Fluidization)

KITLER, Igor' Nikolayevich; LAYNER, Yuriy Abramovich; MALYSHEV,
M.F., kand. tekhn. nauk, retsenzent; BELYAYEV, A.I., red.;
EL'KIND, L.M., red.izd-ve; KARASEV, A.I., tekhn. red.

[Nepheline rocks are complex raw materials for the aluminum
industry] Nefeliny - kompleksnoe syr'e aluminievoi promysh-
lennosti. Moskva, Metallurgizdat, 1962. 236 p. (MIRA 15:8)

1. Chlen-korrespondent Akademii nauk SSSR (for Belyayev).
(Nepheline)

CHIZHIKOV, D.M.; KITLER, I.N.; LAYNER, Yu.A.

Crystallization of aluminates from solutions with a high
caustic relation. Trudy Inst. met. no.12:59-65 '63.

(MIRA 16:6)

(Aluminates) (Crystallization)

LAYNOYA, L. [Lainoja, L.]

Height and radius of excavator unloading in a system of development when removal is divided into two benches. Khim. i tekhn.gor.slav. i prod. ikh perer. no.12:76-81 '63.
(MIRA 17:2)

L 44202-66 JKT/DRJ/JT

ACC NR: AN6012197 (A,N) SOURCE CODE: UR/9008/65/000/296/0003/0003

AUTHOR: Layok, V. (*Major general; Member of council of war; Chief of political section of railroad forces*)

ORG: none

TITLE: Soldiers who stormed the Sayan Mountains

SOURCE: Krasnaya zvezda, 17 Dec 65, p. 3, co. 1-4

TOPIC TAGS: railway construction, railway engineering, military personnel, military engineering, ~~explosion~~

ABSTRACT: The article describes some incidents during the construction of the recently completed Abakan-Tayshet railroad, and gives some details on its construction. Railroad troops and military engineers took part in the construction. Mention is made of an officer who died during an explosion in order to save other men, and who was posthumously awarded the Order of the Patriotic War, second degree. Orig. art. has: 1 figure. [GC]

SUB CODE: 13, 05/ SUBM DATE: none/

Card 1/1 JS

LAYOK, V.D.

Bee Culture - Kara Kalpak

Kara-Kalpak bee culture needs to adopt the socialist tempo of development. Pchelovodstvo
29 no. 9, 1952.

Monthly List of Russian Accessions, Library of Congress, November 1952. Unclassified.

SAVCHENKO, YA. M.; YURTSOVSKIY, M. A.; LAYOK, V. D.; DRYAGINA, I. V.; LEVSHIN, A.N.

Honey Plants

New honey plants, Pchelovodstvo, 29, No. 10, 1952.

9. Monthly List of Russian Accessions, Library of Congress, November 1952. UNCLASSIFIED.

NEVSKAYA, Valeninta Pavlovna; LAYPANOV, Kh.O., kand. ist. nauk,
red.; ATMAKIN, I.A., red.

[Social and economic development of Karachay in the 19th
century; prereform period] Sotsial'no-ekonomicheskoe raz-
vitie Karachaia v XIX veke; doreformennyi period. Pod red.Kh.O.
Laipanova. Cherkessk, Karachaevo-Cherkesskoe knizhnoe izd-
vo, 1960. 159 p.
(MIRA 17:7)

LAYRAND, D. B.

On the cytochemistry of wood elements. Drevarsky vykus
no. 1: 1-11 '63.

1. Kafedra anatomii i fiziologii rasteniy Leningradskoy
ordena Lenina lesotekhnicheskoy akademii im. S.M.Kirova.

L 27206-66 EWP(j)/EWT(m) RM

ACC NR: AP6011571

SOURCE CODE: UR/0051/66/020/003/0505/0507

AUTHORS: Mamedov, Kh. I.; Laypanov, R. Z.

ORG: none

TITLE: Concerning the appearance of lines and a background in the quasi-line spectrum of phosphorescence in quinoline and paraffins at 77K

SOURCE: Optika i spektroskopiya, v. 20, no. 3, 1966, 505-507

TOPIC TAGS: line spectrum, continuous spectrum, phosphorescence, naphthalene, organic solvent, optic transition, *petroleum product*

ABSTRACT: This is a continuation of earlier work (Izv. AN SSSR ser. fiz. v. 27, 605, 1963) where attention was called to the fact that each individual band in the phosphorescence spectra of the homologs of naphthalene in paraffins at 77K consists of a clear cut line against the background of the band itself. The present article reports some experimental facts observed in the investigation of the quasi-line spectra when the solvent-base (paraffin) is varied. In the case of quinoline in pentane at 77K, the spectrum consists of well resolved narrow doublets against the background of the electron-vibrational bands of width of the order of 100 cm^{-1} . In the case of other solvents (n-hexane, n-heptane,

Card

1/2

UDC: 535.373

L 27206-66

ACC NR: AP6011571

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n-octane) the quinoline phosphorescence spectrum experiences changes in the widths of the doublets and in the relative intensity of the doublets and of the background. If it is assumed that the doublets of the quinoline in the paraffin at 77K are the results of two spatially-separated 'different' quinoline molecules, then the experimental results show that the environments of these molecules are not identical. The different degrees of smearing of the doublet components in such a case indicates an appreciable dependence of the probability of phononless electronic transitions on the method of intrusion of the quinoline molecule into the structure of the solvent. The appearance of the broad band simultaneously with the lines and their behavior on going over to different solvents is in good qualitative agreement with the theory developed for this phenomenon by K. K. Rebane and V. V. Khizhnyakov (Opt. 1 spektr. v. 14, 362, 1963). Orig. art. has: 2 figures

SUB CODE: 20/i/ SUBM DATE: 12Jul65/ ORIG REF: 006/ OTH REF: 001

Card

2/2 CC

LAYPERT, Miloslav, inzh.

Radio and television in socialist Czechoslovakia. Vest. svyazi 21
no.5:14 My '61. (MIRA 14:6)

1. Zamestitel' ministra transporta i svyazi Chekhoslovatskoy
Sovetskoy Respubliki.
(Czechoslovakia--Radio)
(Czechoslovakia--Television)

L 4242-66 EWT(1)/EWT(m)/ETC/EPF(n)-2/EWG(m)/EPA(w)-2/EWA(m)-2 IJP(c)

ACCESSION NR: AT5007973 GS/AT/JXT

S/0000/64/000/000/1023/1029 106
103
81

AUTHOR: Berezin, A. K.; Berezina, G. P.; Bolotin, I. I.; Gorbatenko, M. F.;
Yegorov, A. M.; Zagorodnov, O. G.; Kornilov, B. A.; Kurilko, V. I.; Lutsenko, Ye.
I.; Laypkalo, Yu. M.; Pedenko, N. S.; Kharchenko, I. F.; Shapiro, V. D.;
Shevchenko, V. I.; Faynberg, Ya. B. 44,55 44,55 44,55

TITLE: Acceleration of charged particles with the aid of longitudinal waves in
plasma and plasma waveguides 21,44,55

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963. 44,55
Trudy. Moscow, Atomizdat, 1964, 1023-1029

TOPIC TAGS: high energy accelerator, electron beam, plasma accelerator, plasma
waveguide

ABSTRACT: Plasma waveguides and noncompensated electron and ion beams can be uti-
lized as accelerating systems in linear accelerators (Faynberg, Ya. B., Symposium
CERN 1, 84 1956); *Atomnaya energiya* 6, 431 (1959)). In such systems, slow elec-
tromagnetic waves $v \ll c$ are propagated, which are necessary for particle accelera-
tion. The waveguide properties of restrained plasma and noncompensated beams are
displayed in the case of waves in the meter and centimeter range even for con-
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ACCESSION NR: AT5007973

paratively small plasma densities around 10^9 to 10^{13} cm^{-3}). Under these conditions the high-frequency energy losses during wave propagation, which are due to the collisions of plasma particles, are small. The density of electrons in metals (about 10^{23}) is many orders greater than is necessary for ensuring waveguide properties in the microwave range. This leads to great losses of high-frequency power during wave propagation in metallic conductors. For plasma densities around 10^9 to 10^{13} cm^{-3} , the energy losses during particle transit through the plasma, which are proportional to plasma density, are insignificant, from 10^{-5} to 10^{-6} ev/cm . This means that plasma waveguides are "transparent" for accelerated particles. According to the conditions of acceleration the particles are divided into individual bunches. Thus the loss of particles moving in the plasma can increase greatly because of the occurrence of coherent deceleration representing the inverse of the effect of coherent acceleration, which was established by V. I. Veksler (Symposium CERN 1, 80 (1956)). However, even for accelerated particle fluxes of the order of tens of amperes, these losses are all insignificant. Because waveguide properties are determined by the plasma, the metal surfaces can be remote from regions with large field strengths or eliminated altogether, which permits a significant increase in the permissible voltages of the accelerating fields and a substantial de-

Card 2/5

L 4242-66

ACCESSION NR: AT5007973

crease in the high-frequency energy losses. It is also important to concentrate the electromagnetic energy in the radial direction only in the regions where the accelerated particles are moving. Thus for a given field strength the electromagnetic energy flux decreases markedly. If the fluxes of accelerated particles are large, the waveguide properties necessary for acceleration can be ensured by the particles of the beam which are not entrapped in the acceleration process, through which particles the entrapped particles move. The beam itself which is injected into the accelerator operates under these conditions of an accelerating system. To clarify the possibilities of particle acceleration by means of electromagnetic waves excited by charged particle beams, and also to investigate the influence of beam instabilities upon the acceleration process, the Physicotechnical Institute, Academy of Sciences Ukrainian SSR conducted theoretical and experimental investigations on the interaction of charged particle beams with a plasma. These investigations were intended to lead to, not the design and construction of a definite accelerator model, but the physical processes occurring during the interaction under consideration, and in this way to a determination of the possibilities of plasma methods of acceleration which are being developed at this institute. The theory developed up to the present time of the interaction between beams and plasma has been essentially a linear theory. As a result of the work of V. D. Shapiro and V.

Card 3/5

L 4242-66

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I. Shevchenko at this institute for the case of beams of not very large density, a nonlinear theory has been created which permits one to trace the process of interaction of an initially nonmodulated beam and mono-energetic beam with a plasma from the initial stage to saturation. As is shown, a large part of the beam's energy of ordered motion (75% of its initial energy) is lost by the beam as a result of collective interactions with the plasma. Thus the energy expended upon excitation of oscillations amounts to 30%; upon increasing the thermal energy of the plasma, to 30%; and upon increasing the thermal energy of beam, to 15%. The experimental investigations of this interaction were carried out by I. F. Kharchenko and A. K. Berezin and their respective co-workers. Their results are in agreement with the theory of M. F. Gorbatenko. The mentioned institute has also carried out further theoretical and experimental investigations on the problems of electromagnetic wave propagation in plasma waveguides excited by high-frequency wall sources. The experimental studies, by O. G. Zagorodnov, et al., showed that the results agree well with theory under conditions of insignificant nonlinear effects. Current experiments are concerned with highly-ionized plasmas with density 10^{11} to 10^{12} . Orig. art. has: 4 figures, 1 table.

Card 4/5

L 4242-66

ACCESSION NR: AT5007973

ASSOCIATION: Fiziko-tehnicheskiy institut AN UkrSSR (Physicotechnical Institute,
AN UkrSSR)

SUBMITTED: 26May64

ENCL: 00

SUB CODE: NP

NO REF SOV: 005

OTHER: 001

BVK
Card 5/5